

said of the standard traverses. The regulations of the department (1908) admit the same closure error, 20" for the triangles of both the major and minor triangulation; but doubtless in the new second order work the average error is much less.

Magnetic and seismographic records were regularly obtained at the observatory at Christchurch, and progress was made with the reduction of the observations of the magnetic survey, though no mention is made of an extension of the field work. The most important seismograph traces are reproduced.

Tide gauges are in operation at ten ports, and the methods of reducing the observations are discussed. To economise time and labour mechanical computation is largely employed, and mechanical plotting of coordinates with the aid of a co-ordinatograph is about to be introduced. In this connection we note the commencement of precise levelling at Wellington, but neither the instruments nor the permissible differences in the work are mentioned.

The report of the Colonial Survey Committee for the year 1910-11, dealing with the surveying work which is being carried out in the Crown colonies and in Ceylon, contains much interesting information, and shows a steady improvement in the quality of the work. The expenditure on land measurement and work connected with it in ten colonies amounted to about 65,000*l.*, besides about 80,000*l.* which was expended by Ceylon.

Everywhere the need for accurate surveys is felt, and in every colony where work has been done cadastral (landed property) surveys are in progress. For these a higher accuracy for control is needed than for topographical surveys, which are on smaller scales and do not deal with so sharply defined boundaries. The employment of trustworthy triangulation is steadily increasing, but still it is in progress in five only of the nine colonies which report that cadastral surveys are being carried on. For some colonies the accuracy of the work is stated, and triangular closing errors of 2" to 5" for second order triangulation and of 8" to 12" for third order triangles speak of excellent work done under conditions which are frequently most trying. There are some survey departments which do not report on the accuracy of their work in this way, and the value and interest of the report would be greatly increased if not only the angular precision were stated but generally the accuracy, the rate, and the cost of the different classes of work.

The number of control points available for the detail survey is also a matter of great interest to surveyors, and the interchange of such information on a systematic plan, as is done in the reports of the survey of Indian and of most foreign surveys, would be of much value. In Fiji a base-line 19,320 ft. in length was measured with a probable error of field observation of 1 in 4,000,000, but including errors arising from coefficient of error and temperature of the tape and of standardisation, the probable error of the base is put at 1 in 260,000. The stereophotographic method of sur-

vey is being employed here for plotting on the scale of 1 : 31,250 with 100-foot contours.

Cyprus appears in the report for the first time, and here a cadastral survey of the landed property in the island has been commenced, as required by the law passed in 1909 for the revaluation and registration of property in the land; it is based on a triangulation originally executed for topographical purposes, and will therefore need some revision to make it adequate as a control of the registration of small holdings. H. G. L.

NOTES.

THE first conversazione of the Royal Society for this year will be held in the rooms of the society at Burlington House on May 8.

DR. C. H. READ has been elected president of the Society of Antiquaries for the ensuing year.

WE regret to see the announcement of the death, on April 28, of Mr. J. Gray, honorary treasurer of the Royal Anthropological Institute and examiner at the Patent Office.

It is stated in *Science* that the late Prof. Abbott L. Rotch has bequeathed to Harvard University the Blue Hill Meteorological Observatory, which he established in 1885 and directed up to the time of his death. He has further provided an endowment fund of 10,000*l.*

ON Friday, May 10, the third May lecture of the Institute of Metals will be delivered by Sir J. Alfred Ewing, K.C.B., F.R.S., on "The Inner Structure of Simple Metals." Cards of invitation admitting to the lecture can be obtained on application to Mr. G. Shaw Scott, secretary of the Institute of Metals, Caxton House, Westminster, S.W.

THE annual dinner of the Society of Engineers (Incorporated) will be held at the Criterion Restaurant, Piccadilly Circus, W., on Saturday, May 11, when Mr. John Kennedy, the president, will take the chair. Among those who have promised to attend are Sir Wm. H. M. Christie, K.C.B., F.R.S., Sir David Gill, K.C.B., F.R.S., Sir Maurice Fitzmaurice, chief engineer to the London County Council, Mr. Alexander Siemens, past-president Inst.C.E., and Mr. H. P. Boulnois, chairman of the Royal Sanitary Institute.

THE Royal Meteorological Society will meet at Southport at the end of next week, by invitation of the Mayor and Corporation. On Saturday, May 11, a popular lantern lecture, "A Chat about the Weather," will be given by Mr. W. Marriott, and on Monday, May 13, there will be visits to the Marshside Anemograph Station and the Fernley Observatory, Hesketh Park, succeeded by a meeting of the society, at which the papers to be read are:—Results of hourly wind and rainfall records at Southport, 1902-11, by Mr. J. Baxendell; the south-east trade wind at St. Helena, by Mr. J. S. Dines.

DR. IRA REMSEN has sent in his resignation of the presidency of Johns Hopkins University, Baltimore,

to take effect at the end of the present academic year. He succeeded the late Dr. Daniel Coit Gilman, the first president of the University, in 1902. Dr. Remsen will retain the chair of chemistry, which he has held since 1876, and hopes to find time to return to research work. In his letter to the board of trustees, he points out that the University is confronted by new problems, and urges that the policies to deal with them should be entrusted to someone who has "a reasonable expectation of a long term of service."

THE death is reported, at Beguio, in the Philippines, of Dr. Paul Caspar Freer, at the age of fifty. He was a graduate in medicine of the Rush Medical College, Chicago, and took the Ph.D. of Munich in 1887. After spending a short time as assistant to Dr. Perkin, at Owens College, Manchester, he joined the staff of Tufts College, Massachusetts. From 1889 to 1903 he was professor of general chemistry at the University of Michigan. He then went to Manila as superintendent of the Government laboratories there, and in 1905 was appointed director of the Bureau of Science for the Philippine Islands. He was the editor of *The Philippine Journal of Science*, and the author of various chemical textbooks and monographs. He had been mentioned recently as a possible successor to Dr. Wiley as chief of the Bureau of Chemistry at Washington.

THE council of the Association des Ingénieurs électriciens sortis de l'Institut électrotechnique Montefiore has circulated the conditions of award of the prize known as the Fondation George Montefiore. The prize represents the accumulated interest at 3 per cent. on a capital of 6000l., and is awarded every three years for the best original work on the scientific advancement and progress in the technical applications of electricity in all its branches. The prize was awarded for the first time in 1911, and will be offered again in 1914. The last date for receiving competing works is March 31, 1914, and they should be addressed to M. le Secrétaire-archiviste de la Fondation George Montefiore, l'hôtel de l'Association, rue St-Gilles, 31, Liège, Belgium.

A VERY promising career has been ended prematurely by the accidental death of Mr. George Borup, who was drowned in Long Island Sound a few days ago through the upsetting of a canoe. As announced in last week's NATURE, Mr. Borup was to be one of the leaders of the expedition which will shortly set out to reach and map Crocker Land, in the north polar seas. He was assistant curator of geology in the American Museum of Natural History, and was well known by his work with Admiral Peary in the expedition to the north pole, and his book "A Tenderfoot with Peary." During the past two and a half years he had been devoting his whole attention to studies in the field and at Yale to fit him thoroughly for scientific geological and geographical exploration. He took up geographical work seriously and from a scientific point of view; and it is with regret that we have to announce the loss of a life from which many years of valuable work were anticipated.

APRIL was almost rainless over the south-east of England, and without doubt in a few isolated positions there was absolutely no rain throughout the month. At Greenwich the only rain measured is 0.02 in. on April 9, and with the exception of 0.07 in. on March 31, this is the only rain since March 23. The monthly records of rain at Greenwich from 1815 fail to show any month with so small an amount of rain. The previous smallest amounts are in July, 1821, 0.04 in., and in February, 1891, 0.05 in. The total rainfall in April has only twice fallen below 0.1 in., these being in 1817, 0.06 in., and in 1855, 0.09 in. In the memorable spring drought of 1893 the rainfall for April was 0.12 in. The duration of bright sunshine at Greenwich for April was 225 hours, which is 85 hours more than the average of the past thirty years, but it is 25 hours less than the duration of sunshine in April, 1909. The mean temperature for April was 49.7°, which is 1.6° in excess of the average; and on three days, from April 19 to 21, the sheltered thermometer rose to 70° or above. The temperature was generally lower towards the end of the month, due to the setting in of a northerly and north-easterly wind. The aggregate rainfall for April was only 0.02 in. at Oxford, 0.14 in. at both Dover and Shields, 0.19 in. at Clacton-on-Sea, 0.20 in. at Nottingham, and 0.25 in. at Bath. The most recent summary of the weather issued by the Meteorological Office shows that for the eight weeks of spring ending April 27 the aggregate rainfall is in excess of the average in all districts, except in the east of Scotland and in the east and north-east of England, whilst the rainfall since the commencement of the year is everywhere in excess of the average, except in the north and east of Scotland.

A CONFERENCE of members of the Museums Association and others interested in the work of museums was held at Stockport on Thursday, April 25. Besides members of the committee of the Stockport Municipal Museum and local visitors, representatives attended from some twenty public museums in Lancashire, Cheshire, and Yorkshire, including those at Manchester, Liverpool, Sheffield, Hull, Salford, Ralton, Bootle, Rochdale, and Warrington. The conference assembled at the Vernon Park Museum, which was duly inspected. After tea, to which the members were invited by the museum committee, a meeting was held in the Town Hall, under the presidency of Alderman Briggs, Mayor of Stockport, and chairman of the Education Committee, who welcomed the conference on behalf of the Corporation, adding a few words on the value of museums as factors in the education problem of which insufficient use was made. Mr. T. Sheppard (Hull) in a humorous paper gave an interesting account of the development of the Museum of Fisheries and Shipping which was recently opened as a department of the Hull Municipal Museum. The paper contained many practical suggestions and a moral for other curators. Mr. R. Butterfield (Keighley) read a short paper advocating the use of three-ply board as a backing

for cases and other purposes, which led to considerable discussion; he also exhibited and described a relief model of the district surrounding the Keighley Museum, which could be used as a basis for the elementary teaching of geology, natural history, and history, as well as for geography. Mr. Hewitt (Stockport) read an account of the history of the Stockport Museum, pointing out the difficulties under which it labours, and foreshadowing the lines on which it might profitably be developed.

MUCH new light is thrown on the possibility of the production of symmetrically formed prehistoric pottery without the use of the wheel or a regularly constructed kiln by the researches of the Rev. J. W. Hayes, recorded in the *Journal of the Royal Anthropological Institute* for July-December, 1911. At one small factory at Verwood, near Wimborne, he found most primitive methods in operation for the production of milk and water pans, the clay being worked up in a tank by barefooted boys, as Italian peasants tread the grapes in a wine-vat, the only tool used, besides a piece of string to cut the finished article off the wheel when finished, being a piece of hoop iron to smooth the edges of the pot. It is interesting to note that the process of building up the jar by the junction of separate pieces, the joinings being closed by tapping with a mallet, is still apparent in many prehistoric pots in the British Museum.

IN the issue of the *Journal of the Royal Anthropological Institute* for July-December, 1911, Major A. O'Brien gives a graphic and interesting account of the difficulties experienced by a district officer in dealing with the guardians of the multitudinous shrines of Mohammedan saints which abound in the valley of the Indus. Devotion to these worthies constitutes the working faith of the majority of the population, and the appeal to Allah or the Prophet is forgotten in the reverence paid to their local vice-regents. All sorts of miracle-working powers are attributed to these holy men, and pilgrimages to their shrines are undertaken to provide for all the ordinary wants and hopes of the peasantry. The permanence of primitive animistic beliefs of this kind is shown in the fact that sanctity clings to certain sites from prehistoric times. Thus at the shrine now occupied by the saint Sakhi Sarwar, in the Dera Ghazi Khan district, men, women and children, Sikhs, Hindus, and Mohammedans alike resort to make vows and present offerings to the officiating guardians, including a company of old women representing the wife of the holy man, who devote themselves to the collection of dues from female votaries.

A SEVENTH report on research work, by Dr. Houston, director of water examinations, has been issued by the Metropolitan Water Board. The search for pathogenic microbes in raw river water, with special reference to the typhoid bacillus, has been continued. Taking all the results together, the study of 20,771 specially selected organisms derived from 215 samples of raw river water has resulted in the discovery of only two typhoid-like microbes. Typhoid bacilli derived directly from the patient, and without cultivation on artificial media, are found to

be less resistant and to die out quicker in water than the same organisms after artificial cultivation. The temperature of the water influences the rate of disappearance of typhoid bacilli from water; the effect of low temperature (41° F. to 32° F.) is to delay considerably the diminution in numbers of typhoid bacilli. In a previous report, storage of the raw river water was shown to improve materially the condition of the water. Experiments are detailed on the use of a precipitation method (with "alumino-ferric") antecedent to storage as an additional means of purification. This is found to possess considerable advantage, but it materially increases the cost of purification.

THE April number of *The American Naturalist* contains the first part of a Harvey lecture delivered by Prof. H. F. Osborn on January 20 on the continuous origin of certain unit characters as observed by a palæontologist. Comment may be reserved until the completion of the report.

EELS, new and otherwise, from all parts of the world, form the subject of a long article by Dr. H. W. Fowler in the February issue of the *Proceedings of the Philadelphia Academy*. The forms described as new are nine in number, and two new subgeneric terms are also proposed. It may be noted that the name *Leptocephalus conger* is adopted for the conger, and that *Echidna* is employed for another genus, the latter usage barring the application of that term, in a generic sense, to the spiny anteater of Australasia.

FOSSIL whales akin to the modern finners form the subject of an article by Prof. F. W. True, published as vol. lix., No. 6, of *Smithsonian Miscellaneous Contributions*, which mainly consists of a summary of a paper in Danish by Dr. H. Winge. Both writers consider that among a multitude of extinct generic divisions which have been proposed, four are undoubtedly valid, namely, *Aulocetus*, *Cetotherium*, *Herpetocetus*, and *Plesiocetus*, and of these, as well as of the two allied existing genera, diagnoses based on osteological characters are appended.

As the first portion of a work entitled "The Fishes of the Indo-Australian Archipelago," Drs. Max Weber and L. F. de Beaufort have compiled an index to the ichthyological papers of Pieter Bleeker, published, as a volume of 410 pp., by E. J. Brill, Ltd., Leyden. Bleeker's papers are not only very numerous—the more important comprising no fewer than 432—but much scattered; and this index, not only of the articles themselves, but of the genera and species mentioned in them, will prove of great value to ichthyologists. The volume commences with a portrait and biography of Bleeker, who was born at Zaandam in 1819 and trained as an apothecary. In 1840 he qualified, however, as a surgeon and general practitioner, and in the following year was appointed surgeon in the Dutch East Indian Army. He arrived at Batavia in the spring of 1842, where he spent the greater portion of the next sixteen years, the intervals including sojourns at other stations and a trip to Celebes and the Moluccas. Here he soon commenced the study of the local fish-fauna, which culminated in

the issue of the "Atlas Ichthyologique des Indes Orientales," the completion of which was prevented by the death of the author in 1878.

IN *The Kew Bulletin* (1912, No. 3), J. H. Holland gives a useful review of the sources whence alcohol is obtained, these sources being treated under the heads of fruits, grain, roots, rhizomes, stems, leaves, inflorescences, wood, and peat. Interesting statistics are given with reference to the distillation of industrial alcohol from the potato in Germany and Poland, from the beet in France, and from maize and wood in the United States. There appears to be no bar, apart from fiscal and transport difficulties (which could readily be overcome), to the development of flourishing industries of this kind in our own country. The statements available at present regarding the production of alcohol on a commercial scale from peat are, unfortunately, meagre and contradictory; success has been reported from Sweden, failure from France. The Swedish experimenters claim that alcohol made from peat can be sold at less than one-half the present price of alcohol, and lower than the present price of petroleum.

PROF. R. PEPPERT, in a memoir issued by the Ministry of Agriculture in the Argentine Republic, deals with the world's supply of citric acid, which comes chiefly from Sicily, and gives interesting details concerning the species and varieties of Citrus, chemical analyses of the fruits used in the industry, and the methods of extraction on the commercial scale. Mention is made of Wehmer's discovery that citric acid can be made from artificial glucose by fermentation by various micro-organisms (*Citromyces pfefferianus*, *Penicillium luteum*, *Mucor pyri-formia*), but it seems that this process yields only 2 or 3 per cent. of citric acid instead of the 50 per cent. promised by the laboratory experiments. The author points out that the climate and soil in the fertile Tucuman province of Argentina are admirably suited for the growing of lemons, that the fruits grown locally are in no way inferior to those of the Mediterranean region in their yield of citric acid, and that with capital and enterprise a flourishing citrate industry may well be established in Argentina.

MR. P. MACNAIR, whose useful "Introduction to the Study of Rocks" has been already noticed (*NATURE*, April 13, 1911), now issues an "Introduction to the Study of Fossils and Guide to the Palæontological Collections in Kelvingrove Museum," Glasgow, price 3d., with some forty illustrations. The Silurian eurypterids and fishes of Lesmahagow are well referred to, and Scottish fossils are properly emphasised throughout. The book will no doubt soon reach another edition, and certain misprints in generic names can then be rectified.

THE prehistoric human remains near Cuzco, in Peru, which occur low down in the face of a high gravel cliff, are dealt with in considerable detail in three papers by H. Bingham, T. Bowman, and G. F. Eaton in *The American Journal of Science*

(vol. xxxiii., pp. 297-333, April). The bones described appear to be contemporaneous with the bedded gravels, which are regarded as a glacial series, an approximate age being assigned to them of 20,000 to 40,000 years ago. The valley of Ayahuaycco quebrada, or "dead man's gulch," in which they occur, has been used in modern times as a burial ground, and great caution is shown by the explorers in making the above suggestion.

Symons's Meteorological Magazine for April contains an account of the meteorological service of the Argentine Republic, by Sr. W. G. Davis (director), which is of much interest, owing to geographical position and large extent of country, as well as to the activity with which the science has been pursued. The service was established by Dr. B. A. Gould in 1872, and the results of the observations made up to the time of his retirement in 1884 were printed in four large quarto volumes. The service was continued on the same lines by the present director until the year 1900. The first daily weather chart was published in 1902, and forecasts are now issued for thirty-six hours in advance. The charts show the conditions existing from Para (Brazil) to the southernmost limits of the Republic, extending over 55° of latitude. In addition to the central office at Buenos Aires, there are two principal observatories at Cordova and Chacarita where special researches are carried on; and a fully equipped meteorological and magnetic station is maintained at South Orkney, in 61° S. latitude. The work of the meteorological office includes a seismological service, which will shortly embrace a line of stations along practically the whole of the north-to-south extent of the Republic.

A REPORT on the daily sunshine in Russia was presented to the Imperial Academy of Science in January (*Bulletin*, February 15). The duration of sunshine in European Russia increases on the whole from north to south and from west to east, being, however, somewhat longer on the coast than in the interior. In the yearly means the lowest maximum is recorded at St. Petersburg, where it occurs between noon and one o'clock, and attains to 11.9 hours (this figure being obtained from the means of thirty days in each month). The highest maximum in European Russia is 19.8 hours in Uralsk; in Bairam-Ali it is 23.9 hours, and 23.6 hours in Chita. The monthly maximum occurs at Bairam-Ali in August, and amounts to 30.8 hours, i.e. during thirty-one hours of observation the sun is on an average obscured by clouds for only twelve minutes. In St. Petersburg the maximum is reached in July, and is 18.8 hours. Sunshine is more frequent in winter during the afternoon and in summer in the forenoon. Only in St. Petersburg is sunshine more prevalent after noon in all months, attaining 60 per cent. of the possible in December and 50.4 in October. In January sunshine is more frequent at all stations in the afternoon, and in May in the forenoon, except in St. Petersburg, but the difference between the morning and afternoon is much less in summer than in winter. The greatest difference occurs in Irkutsk, where the sunshine in

the afternoon amounts in December to 65 per cent. of the possible. From twenty-five years' observations in Pavlovsk, it appears that in winter the maximum occurred later, and the afternoon sunshine was greater, in the clear months, that is, those in which the sunshine was above the average during the period; whereas in the summer months the reverse was the case.

THE Journal of the Washington Academy of Sciences for April 4 contains a summary of the results obtained by Messrs. Day and Sosman, of the Geophysical Laboratory of the Carnegie Institution, in their recent determination of standard melting and boiling points on the constant volume nitrogen thermometer and in terms of the thermodynamic scale. In some cases the determination was made directly, in others by the intervention of platinum-platinum-rhodium or copper-constantan thermocouples. The following melting points were found:—cadmium 320.8° , zinc 419.3° , antimony 629.8° ; and the following boiling points at normal pressure:—benzophenone 305.85° , sulphur 444.4° , on the constant volume nitrogen thermometer. These become on the thermodynamic scale 320.9° , 419.4° , 630.0° , 305.9° , and 444.55° respectively.

Two sets of measurements of the electric charge on rain made during last year are already available. The first, covering the short period March to June, were made in Dublin by Prof. McClelland and Mr. Nolan, and are published in the February Proceedings of the Royal Irish Academy; the second, from May to December, made at Puy-en-Velay, central France, by M. Baldit, appear in the March number of *Le Radium*. Both sets agree in giving an excess of positive over negative electricity brought down by rain, and the Dublin observations show that large drops are nearly always positively charged. At Puy-en-Velay the charge per cubic centimetre of rain is greater for negatively charged than for positively charged, while the reverse is true for Dublin. The mean electric current to earth per square centimetre of surface during rain, according to the Puy-en-Velay observations, is between 3 and 5×10^{-14} ampere.

DR. HANS STRECKER finds that if strong aqueous solutions of gelatine and gum arabic are shaken together they do not mix, but form an emulsion. On standing there is much agitation of the droplets of the one that is in the smaller proportion, they coalesce to a certain extent, and there results an even distribution of spherical globules of an approximately equal size, the size depending upon various conditions. He describes in the last number (April 15) of the *Revue générale des Sciences* the use of such an emulsion in various photomechanical processes. It will take the place of the asphalt grain in photo-gravure, and it will serve instead of the lined screen in the making of half-tone blocks. For these purposes the gelatine is in excess, and the particles of gum in the dried film are less easily penetrated by the etching liquid than the gelatine in which they have been formed. The making of half-tone blocks

is much simplified by this process, which has the further advantage that solid or continuous lines in the original are not broken up as they are when reproduced by means of a lined screen. The author calls this process "stigmatypie," and gives two illustrations of it which certainly show that the process has the advantages claimed for it.

IN vol. iv., part i., of the Transactions and Notes of the Concrete Institute is contained an interesting photograph of a rag bolt found last summer embedded in a slab of concrete composed of Portland cement, ballast, and broken bricks. The concrete formed part of the foundations of the 1862 exhibition buildings at South Kensington, and had not been disturbed up to the time of its removal. The bolt was found when cutting through the concrete slab for some alteration in connection with the Imperial Institute, and was at ground-level. Both concrete and bolt were under cover. Only the top end of the bolt where exposed to the atmosphere, and the bottom end where embedded in the soil, were corroded; the remainder was quite clean, with the original blue scale thereon. This may be regarded as another proof that the reinforcement bars in ferro-concrete work will be preserved for an indefinite time provided that the concrete is maintained free from cracks.

OUR ASTRONOMICAL COLUMN.

ASTRONOMICAL OCCURRENCES FOR MAY:

- May 3. 14h. 9m. Jupiter in conjunction with the Moon (Jupiter $5^{\circ} 2' N.$).
 4. 2h. 0m. Mars at greatest heliocentric latitude $N.$
 7. 13h. 36m. Uranus in conjunction with the Moon (Uranus $4^{\circ} 41' N.$).
 „ 23h. 0m. Uranus stationary.
 12. 15h. 10m. Mars in conjunction with Neptune (Mars $2^{\circ} 9' N.$).
 „ 21h. 0m. Mercury at greatest elongation $W.$
 14. 6h. 0m. Saturn in conjunction with the Sun.
 15. 10h. 45m. Venus in conjunction with the Moon (Venus $3^{\circ} 11' S.$).
 16. 9h. 11m. Saturn in conjunction with the Moon (Saturn $4^{\circ} 58' S.$).
 20. 5h. 1m. Neptune in conjunction with the Moon. (Neptune $5^{\circ} 46' S.$).
 „ 12h. 4m. Mars in conjunction with the Moon (Mars $3^{\circ} 42' S.$).
 27. 8h. 47m. Venus in conjunction with Saturn (Venus $1^{\circ} 7' N.$).
 30. 15h. 49m. Jupiter in conjunction with the Moon (Jupiter $4^{\circ} 48' N.$).
 31. 22h. 0m. Jupiter at opposition to the Sun.

COMETARY SPECTRA.—In an article recently noted in these columns, MM. Pluvinel and Baldet, while agreeing as to the identity of certain doublets in the spectra of Morehouse's comet with similar doublets in Prof. Fowler's spectrum of carbon monoxide at very low pressure, pointed out that only twelve of their twenty-one cometary bands were represented in the published laboratory spectrum, and of these twelve there were serious discrepancies of wavelength in two cases.

Prof. Fowler now points out (*Astrophysical Journal*, vol. xxxv., No. 2) that there are probably